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Attorney's Docket No.: 10559/401001/P10338

REMARKS

Claims 1-3 and 5-39 are currently pending in the application. Claims 1-3 and 5-39 stand rejected as allegedly being unpatentable over one or more of Nair et al. "Exploiting Instruction Level Parallelism in Processors by Caching Scheduled Groups," ("Nair"), U.S. Patent No. 6,092,187 to Killian ("Killian"), and Tullsen et al. "Simultaneous Multithreading: Maximizing On-chip Parallelism" ("Tullsen").

In view of the remarks herein, the rejections are respectfully traversed. Reconsideration and allowance are respectfully requested.

Claim 1

Claim 1 is patentable over Nair because Nair neither teaches nor suggests "each of the plurality of traces including information indicative of interdependent instructions, which interdependent instructions include at least an associated instruction and a criterion instruction that is part of a program sequence and which is data dependent on said associated instruction," as recited in claim 1.

In some places, the office action refers to the complete set of instructions in Figure 2 as a "trace," while in others, some of the individual groups in slots 0-4 of Figure 7 are referred to as a "trace." It is respectfully noted that these positions may not both be maintained.

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For example, on page 3, the office action notes that lwz instruction of slot 3 depends on the lwz instruction of slot 3 of Nair. Thus, the "trace" for the office action's purpose in discussing one feature of claim 1 is the entire set of instructions (the complete set of instructions in Figure 2 of Nair, and as translated in slots 0-4 of Figure 7 of Nair).

However, further down on page 3, the office action states that "Traces or groups 0-3 are a plurality of traces and each contain a criterion instruction according to the definition." Thus, for the office action's purpose in discussing a different feature of claim 1, a "trace" is a group (the set of instructions in a particular slot 0-4 of Figure 7 of Nair).

If the groups of Nair (i.e., the instructions in each of slots 0-4 of Nair) are each a "trace," then claim 1 is patentable because not all groups include at least an associated instruction and a criterion instruction.

If the complete set of instructions shown in Figure 2 of Nair (sometimes referred to as a DIF group) is a "trace," then the office action does not point to any teaching that Nair teaches a plurality of traces (i.e., a plurality of sets that each include at least an associated instruction and a criterion instruction). Additionally, this inconsistent interpretation of the elements of Nair is improperly used to reject dependent claims such as claim 15 (see below).

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At least because the office action fails to consistently identify a teaching of Nair corresponding to a "trace," claim 1 is patentable over Nair.

Additionally, if the complete set of instructions in Figure 2 (and in Figure 7 after translation) is identified as a "trace," Nair neither teaches nor suggests "one or more processors that speculatively execute interdependent instructions associated with a first trace of the plurality of traces as a result of detecting a first triggering condition corresponding to the first trace," as recited in claim 1 (emphasis added).

Rather than speculatively executing interdependent instructions associated with a first trace, Nair teaches that DIF groups contain "information associated with each conditional branch that allows control flow to resume at the branch when the learnt direction differs from the actual." (Please see page 16, column 1 of Nair). For example, Nair teaches that two simultaneous write operations are performed on register 25 in slot 0 of Figure 7. According to Nair, one of the two values will be discarded depending on the outcome of the conditional branch. (Please see page 17, column 1 of Nair).

At least because Nair teaches that DIF groups contain information associated with each conditional branch, rather than

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speculative execution of interdependent instructions associated with particular traces, claim 1 is patentable over Nair.

For at least the above reasons, claim 1 is patentable over Nair.

Claims 2-3, 5-19 and 32-34

Claims 2-3, 5-19 and 32-34 depend from claim 1, and are therefore patentable for at least the reasons stated above with respect to claim 1.

Claim 11

Claim 11 is patentable for at least the additional reason that it is not obvious to modify the Nair to include "wherein the one or more processors further determine a confidence metric of trace information associated with a specific trace, and wherein the confidence metric is indicative of a likelihood of producing a correct result from executing the specific trace," as recited in claim 11.

Obviousness requires three things. First, the references must teach or suggest each feature of the claims. Second, there must be a reasonable expectation of success. Third, there must be a motivation to make the suggested combination. Please see MPEP 2143). Here, there is no motivation to make the suggested combination of Nair and Killian.

The office action alleges that the motivation is that "it is well known in the art that greater confidence in a prediction

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is desirable. This greater confidence would have motivated one of ordinary skill in the art to modify the design of Nair to use the confidence levels taught by Killian. With this modification, the instructions or information in the traces are assessed with a confidence metric." (Please see page 9 of the office action).

However, as noted above, rather than speculative execution, the DIF groups of Nair contain information associated with each conditional branch. Nair clearly differentiates its system, which computes branch information at learning time, with a superscalar machine, where it is recomputed dynamically for every speculated branch. (Please see page 16, column 1 of Nair). Since Nair teaches that branch information is computed at learning time rather than computed dynamically for every speculated branch, there is no motivation to modify Nair to include a confidence metric.

For at least the above additional reason, claim 11 is patentable over the combination of Nair and Killian.

Claim 15

Claim 15 is patentable for at least the additional reason that Nair neither teaches nor suggests "wherein the plurality of traces includes a second trace and a third trace, wherein the second and third traces are independent of each other and adjacent in the program sequence, and further comprising

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grouping the second trace and the third trace into a very-long-instruction-word," as recited in claim 15.

As noted above, the office action inconsistently identifies elements of Nair as being a "trace." In the rejection of claim 15, the office action states "Thus each instruction in itself is a trace of the length of one instruction." (Please see page 6 of the office action.) However, claim 1 clearly states that "each of the plurality of traces including information indicative of interdependent instructions, which interdependent instructions include at least an associated instruction and a criterion instruction that is part of a program sequence and which is data dependent on said associated instruction." Thus, a trace may not include a single instruction.

For at least this additional reason, claim 15 is patentable over the cited references.

Claims 32-34

Claims 32-34 are patentable for at least the additional reason that the office action fails to present a prima facie case of unpatentability for these claims.

For a prima facie case of anticipation, the office action must at least show that the reference includes all elements of a claim. For a prima facie case of obviousness, the references must show all features of a claim, there must be a reasonable

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expectation of success, and there must be a motivation to combine the references.

Thus, at a minimum, the office action needs to point to some teaching or suggestion in the reference(s) for each feature of each claim. The office action does not do so for the above claims.

Instead, the office action incorrectly asserts that "In regard to claims 20-39, as indicated by Applicant, similar limitations exist as provided above for claims 1-3, 5-10, and 15-18 and thus the same arguments presented above apply." (Please see page 7 of the office action).

In contrast to the above assertion, the previous response either presented arguments separately pointing out the patentability of the above-referenced claims (e.g., for claim 20), or asserted their patentability at least based on their dependence on an allowable independent claim. Nowhere was there an indication that claims 20-39 included similar limitations to those of claims 1-3, 5-10, and 15-18.

For at least the above additional reason, claims 32-34 are patentable over the references.

Claims 20-31 and 36-39

Claim 20 is patentable over Nair at least because Nair neither teaches nor suggests "identifying a pre-selected number of initial candidate instructions preceding the criterion

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instruction in the program sequence," and "determining which of the initial candidate instructions are associated instructions, wherein an outcome of the criterion instruction depends on the results of the associated instructions," as recited in claim 20 (emphasis added).

The office action alleges that since the lwz instruction of slot 2 is preceded in program sequence by other instructions, Nair teaches this feature of claim 20.

However, it is respectfully noted that claim 20 requires more than including a criterion instruction and an associated instruction in the trace. The office action fails to point to any teaching or suggestion in Nair that a "pre-selected number of initial candidate instructions" is identified, or any teaching or instruction in Nair of "determining which of the initial candidate instructions are associated instructions." As previously noted, an exemplary implementation including these features is discussed on page 9 of the specification.

In contrast, Nair teaches that "Simultaneous with the execution of a code sequence, this engine determines dependences between instructions, and reformats them in a form convenient for direct execution by the parallel engine." (Please see page 14, column 1 of Nair). Thus, Nair does not teach or suggest any pre-selected number of initial candidate instructions; rather it

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merely teaches that the primary engine determines the dependencies.

For at least the above reason, claim 20 is patentable over Nair.

Claims 21-28 and 36-39

Claims 21-29 and 36-39 depend from claim 20, and are therefore patentable for at least the same reasons.

Claims 21-29 and 36-39 are also patentable for at least the additional reason that the office action fails to present a prima facie case of unpatentability for these claims. As noted above, the office action needs to point to some teaching or suggestion in the reference(s) for each feature of each claim. The office action does not do so for each of the above claims.

Claims 29-31

Claim 29 includes features similar to those of claim 20 discussed above, and is therefore patentable for at least similar reasons. Claims 30 and 31 depend from claim 29, and are thus patentable for at least the same reasons.

CONCLUSION

It is believed that all of the pending claims have been addressed in this paper. However, failure to address a specific rejection, issue, or comment, does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above are not intended to be

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exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Claims 1-3 and 5-39 are in condition for allowance, and a notice to that effect is respectfully solicited. If the Examiner has any questions regarding this response, the Examiner is invited to telephone the undersigned at (858) 678-4311. No fees are believed due. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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